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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,611	01/23/2004	Edwin Otero	67097-360;EH-10974	7280
26096	7590	05/10/2006	EXAMINER	
CARLSON, GASKEY & OLDS, P.C. 400 WEST MAPLE ROAD SUITE 350 BIRMINGHAM, MI 48009			KERNS, KEVIN P	
			ART UNIT	PAPER NUMBER
			1725	

DATE MAILED: 05/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/763,611	Applicant(s) OTERO ET AL.	
	Examiner Kevin P. Kerns	Art Unit 1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) 1-24 and 33-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-32 is/are rejected.
- 7) ☒ Claim(s) 30 and 32 is/are objected to.
- 8) ☒ Claim(s) 1-59 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/26/04, 2/6/06</u> | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Applicants' election with traverse of Group IIb (claims 25-32) in the reply filed on April 28, 2006 is acknowledged. The traversal is on the ground(s) that the dependent claims of Groups IIa and IIb are similar. This is not found persuasive because a search for independent claims 17 and 25 of Groups IIa and IIb, respectively, would involve an undue search burden extending into both classes 164 and 700. For example, a search for a method that includes defining five radii and circumferential arcs of Group IIa would not uncover a method that includes providing and injecting a ceramic slurry into a core die to form a green core with solid portions spaced apart by a corresponding hollow portion of Group IIb, and vice versa, due largely in part to their different classification.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "D2" (should be added to Figure 4 -- see paragraphs [0027] and [0028] of specification). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top

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margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: in paragraph [0009], 8th line, delete "is" before "melts". In paragraph [0009], 14th line, and in paragraph [0030], 16th line, it is unclear what is meant by the term "laue'ding". In paragraph [0027], 11th line, replace "arcs" with "arc" before "56". In paragraph [0030], 2nd line, delete "element" before "having". Appropriate correction is required.

Claim Objections

4. Claims 30 and 32 are objected to because of the following informalities: in the 1st lines of these claims, replace "forth" with "fourth". Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 25-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to independent claim 25, it is unclear what is embodied by the limitation “the at least one support element having a shape optimized to prevent the core from fracturing during a casting process”, as any support element (of high strength, temperature resistance, thick dimension etc.) between adjacent solid core portions would apparently be adequate to prevent the core from fracturing during a casting process. What is the criticality of the optimization of shape for a support element that already has the abovementioned features of strength, temperature resistance etc.?

With regard to claim 28, it is unclear how all “defining” steps would relate to one another to obtain the cross-section(s) of the claimed support element, and what particular dimensions of radii and distances between the centers of radii would optimize the structure(s) of the cross-section(s) of the support element to obtain the approximately elliptical/football shape of Figure 4. For example, if central radius R2 of Figure 4 was assigned a value to be equal to or smaller than radii R1 and R3, such an optimized elliptical/football shape would not occur, and support element shapes obtained would be roughly a cylinder (if all equal radii) or an hourglass (if the central radius R2 was smaller than R1 and R3. Also, if $R1 < R2 < R3$ (or if $R1 > R2 > R3$), a roughly snowman-shape (or structure of conical outer surface) would result without tangential intersection of at least one of the circles of defined radii from the larger fourth and fifth radii. Furthermore, the tangential aspect of the larger fourth and fifth radii would not occur if central radius R2 was equal to R1 and R3, as only a straight line would provide a tangent to the three circles of equal radii. The applicants are advised to clarify the specific relationships between dimensions of radii and distances between the

centers of radii to obtain an approximation of the cross-section of the support element set forth in Figure 4.

With regard to claim 29, the limitation "the first and second radii are substantially equal in length" is indefinite since it is not in agreement with Figure 4, which shows that first and third radii (R1 and R3) are substantially equal in length.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 25-27 insofar as definite (in view of the 35 USC 112, 2nd paragraph rejections) are rejected under 35 U.S.C. 103(a) as being unpatentable over Muntner et al. (US 5,465,780) in view of either Bishop (US 4,596,281) or Frey (US 6,340,047).

Muntner et al. disclose a method of making and machining ceramic cores having complex geometries for use in casting metal parts, in which the method of making the ceramic core 46 (Figure 4) includes the steps of providing a ceramic slurry by injecting through nozzle 82 into a hole 84 of a core die 72 (Figures 5A and 5B) having two die halves (74,76) to form a green/unfired ceramic core 86 to be removed from the core die 72; drying and heating (firing) the green core 86 (Figures 5C and 5D) to harden it and form a fired core 98 (Figures 7 and 8); laser machining and thermally treating the fired core 98; and using the ceramic core in a casting process to form a cast metal part (abstract; column 2, lines 39-62; column 3, lines 9-40; column 5, lines 52-67; column 6, lines 1-6; column 7, line 25 through column 9, line 53; column 10, lines 13-37; column 11, lines 58-67; column 12, lines 1-9; column 14, line 45 through column 16, line 58; and Figures 4, 5, 7, 8, and 11-21). Muntner et al. do not specifically disclose the step of forming at least one support element between adjacent solid core portions within the complex core interior to prevent core fracture during a casting process, leading to minimizing operating mechanical stress in the area of the metal part formed by the at least one support element.

However, Bishop discloses a mold core and method of forming internal passages in an airfoil, in which the method includes providing a ceramic core 28 with solid core portions that include a main section 32 and a cantilevered center section 34, in which

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the core sections (32,34) are held in position with respect to one another by a plurality of support elements (cylindrical pins 68,70 with either cylindrical or flattened end portions (74,76,84,86)), such that the plurality of support elements (pins) are advantageous for preventing relative movement between the core sections (32,34) while enabling the core 28 to withstand forces to which it is subjected during processing in a foundry (abstract; column 1, lines 24-68; column 2, lines 1-5 and 53-68; column 3, line 1 through column 6, line 49; and Figures 1-11).

Also, Frey discloses a core tied cast airfoil, in which the core includes a plurality of legs 44 (solid core sections within the main ceramic core 42) with hollow portions (gaps 46) therebetween, such that a plurality of core ties 52 are provided in the gaps 46 between the solid core sections for the purpose of maintaining alignment of the core legs 44 and reducing the likelihood of core breakage during casting (abstract; column 2, lines 55-60; column 4, lines 35-67; column 5, line 1 through column 7, line 63; and Figure 4).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the method of making and machining ceramic cores having complex geometries for use in casting metal parts, as disclosed by Muntner et al., by forming at least one support element between adjacent solid core portions within the complex core interior to prevent core fracture during a casting process, as taught individually by Bishop and Frey, in order to enable the core to withstand forces to which it is subjected during processing in a foundry (Bishop; abstract; column 1, lines 24-32 and 41-68; column 2, lines 1-5; column 3, lines 43-53;

and column 4, lines 4-6), and to maintain alignment of the core legs and reduce the likelihood of core breakage during casting (Frey; column 5, lines 7-18 and 41-54; column 6, lines 39-54; and column 7, lines 52-63).

10. Claims 28-32 insofar as definite (in view of the 35 USC 112, 2nd paragraph rejections) are rejected under 35 U.S.C. 103(a) as being unpatentable over Muntner et al. (US 5,465,780) in view of either Bishop (US 4,596,281) or Frey (US 6,340,047), as applied to claim 25 above, and further in view of Wang (US 2004/0094287).

Muntner et al. (in view of either Bishop or Frey) disclose and/or suggest the features of claims 25-27. Neither Muntner et al., Bishop, nor Frey specifically discloses the use of support element(s) having cross-section(s) with the dimensions (insofar as definite in view of the 35 USC 112, 2nd paragraph rejections) as defined in claims 28-32.

However, Wang discloses an elliptical core support pin element for a turbine bucket, in which a ceramic core 58 includes a generally cylindrical core support pin element 60 with an elliptical cross-section (similar to the substantially elliptical shape of Figure 4 in the present application), such that the core support pin element with elliptical cross-section is advantageous for increasing the core support stiffness and significantly reducing the likelihood of breakage of the core support (abstract; paragraphs [0006]-[0009] and [0021]-[0029]; and Figures 5-8).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the method of making and machining ceramic cores having complex geometries for use in casting metal parts, as disclosed by

Muntner et al., by forming at least one support element between adjacent solid core portions within the complex core interior to prevent core fracture during a casting process, as taught individually by Bishop and Frey, in order to enable the core to withstand forces to which it is subjected during processing in a foundry (Bishop), and to maintain alignment of the core legs and reduce the likelihood of core breakage during casting (Frey), and by further using the generally cylindrical core support pin element with an elliptical cross-section (similar to the substantially elliptical shape of Figure 4 in the present application), as disclosed by Wang, in order to increase the core support stiffness and significantly reduce the likelihood of breakage of the core support (Wang; paragraph [0026]).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Caccavale et al. and Jago references are also cited in PTO-892.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571) 272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin P. Kerns *Kevin Kerns 5/7/06*
Primary Examiner
Art Unit 1725

KPK
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May 7, 2006